

Sometimes We're Our Own Worst Enemy

I'm a member of a loosely-organized group of "networking" amateur radio operators in the Seattle, Washington area that I call the Puget Sound Amateur Radio TCP/IP Group. (The group's web page is at <http://wetnet.wa.com>.) In the more than ten years that I've been associated with this group, we've done some amazing things in amateur radio networking. For one, our network is one of the few that's based "purely" on TCP/IP (the "language" of the internet, for the abbreviation-impaired). That is, all the routing and transport is done using "raw" TCP/IP instead of relying on an underlying networking system such as FlexNet or Net/ROM. For another, we have a number of 9600 baud bit-regenerative¹ repeaters on the air, some of them located on cellular-telephone towers. We were very active in implementing Linux as routers, and had a full-time internet gateway that was located at a major Seattle-area internet service provider.

In most ways, what we have built is a full-blown wireless internet access system, albeit at "low" speeds of 9600 baud. (If you're used to 1200 baud half-duplex packet radio, once you experience the use of 9600 baud on a bit-regen repeater, you're really spoiled and it's tough to go back to 1200 baud half-duplex.)

The main purpose of the TCP/IP network is experimentation... and learning, in my opinion, two of the higher purposes of amateur radio. We regularly gain new users to the system, and the system continues to evolve with new capabilities. Recently we've added a link to the 56 Kbps repeater in Vancouver through a router located north of Seattle that can see both one of our 9600 baud repeaters in Seattle and the Vancouver-area 56 Kbps repeater in Vancouver. It's likely that at some point in the future all of the routers in our network will be con-

verted to IPv6, and we can all start learning about IPv6 on a working network (that we can afford to break).

It's with considerable dismay, then, that one of the key resources in the Puget Sound Amateur Radio TCP/IP network came under attack recently—by a fellow amateur radio operator.

One of the key repeaters in our network is the 146.98 9600 baud data repeater located on Mount Baldi. This repeater is in a key location to cover almost all of western Washington, and can be reached from a number of locations in eastern Washington. It's the only bit-regenerative repeater on 2 meters in western Washington. Not only is it bit-regenerative, it's operating at 9600 baud. It's truly a unique resource.

Like every other metropolitan area in the U.S., all of the 2 meter repeater pairs in western Washington are allocated. Also like every other metropolitan area of the U.S., amateur radio operators have an absolute plethora of 2 meter repeaters to access. Granted, some of them are "special purpose," with operations on that repeater reserved for special functions or groups such as Search and Rescue or membership in a particular club, but most voice repeaters on 2 meters go almost completely unused.

To me at least, it was mind-boggling that anyone could *want* to put yet another voice repeater on 2 meters in the Seattle area, but apparently there's a backlog of requests to do just that, and the queue is years deep.

The situation that will likely lead to the 146.98 9600 baud data repeater being removed from service is that the coordination for this repeater "lapsed." That the "coordination lapsed" is entirely in the realm of the policies of the local repeater coordination group, the Western Washington Amateur Relay Association (WWARA).

By their policies, when renewal paperwork for "re-coordination" of 146.98 wasn't submitted in a timely manner, the 146.98 repeater pair became available... *despite the undisputable fact that the 146.98 9600 baud data repeater remained on the air!* (A claimed point of confusion is that when listening with a voice radio, 9600 baud transmissions can't be "heard.")

Spotting this "opportunity," an amateur radio operator requested coordination for a new (voice) repeater on 146.98 and was granted coordination. At that point the 146.98 9600 baud data repeater was deemed, *solely by the policies of the WWARA*, to be "interference" to the newly coordinated 146.98 voice repeater.

To me, the question is a simple one: Are the purposes intended for amateur radio served when a unique resource such as the 146.98 9600 baud data repeater is forced off the air to make room for yet another voice repeater that likely will largely be unused? I don't think so.

Lyle Johnson, Prophet

In his banquet speech at the 1996 ARRL and TAPR Digital Communications Conference (text and audio of which is available online at www.tapr.org/tapr/html/Flyle.banquet.html), Lyle Johnson, WA7GXD, postulated about the feasibility of creating the Amateur Radio Service (assuming that it didn't already exist) in 1996 (instead of 1934), and if such a service would offer sufficient benefits to the public to justify the use of the increasingly crowded spectrum. Some of his comments seem chillingly prophetic in the context of the 146.98 9600 baud data repeater situation. Excerpt begins:

In the 1970s, FM repeaters suddenly took over the landscape in Ham Radio when it went from basically zero in 1970 to five thousand today and I imagine that eight years ago it was four thousand, nine hundred and fifty. What's happened today in 1996? You go to Ralph, your local frequency coordinator, and say, "Ralph, I need a frequency for my repeater" and Ralph just kind of says, "What else is new?" Right? There aren't any. So Ralph, your local frequency coordinator, he's empowered as a kind of a God now. He can hand out these frequencies, these frequencies that are worth millions and millions of dollars. Ralph controls them now. And Joe Ham, who's a repeater owner, carefully warehouses that spectrum. He doesn't use it much but he wants to be sure nobody can use it either, so he has his frequency coordination thing. Meanwhile he goes to another channel that Ralph gave him so he can run his remote base on the mountaintop so he can call CQ DX. And that's cool, that's good.

But somebody else went up to a local

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¹ Bit regeneration is like real-time digitizing, except that bits aren't stored in transit; the bits are received, "re-clocked" in the regen circuit (basically, a FIFO, or first-in-first-out), and transmitted nearly simultaneously.

mountaintop with a spectrum analyzer one day and they scanned two meters. And they noticed that "I can't get a repeater allocation, yet if I scan this band and make a graph over twenty-four hours, I'll find that this band is maybe being used five percent." Maybe in our area it's being used twenty percent, but I doubt it. There's something wrong here. So we're very busy organizing things so we can warehouse spectrum with closed repeaters that other people can't use. There's something wrong here I think. Does this sound like a good idea to you? That we promote this, we organize ourselves around this, and we defend this?

Now if you were a public policy maker, how would you feel about this? How would you react to the creation of this kind of a Service? Neither would I. Well, now we've got this what we call Little LEO controversy. The low earth orbiting guys, and they sat up there with their spectrum analyzer and noticed the same thing. So now they've gone to the policy makers, and among the candidate bands, and we've all read the QST editorials; there's two meters and seventy centimeters on the table for consideration. Not to be taken, but to be shared. And we're treating this, and I suppose properly, as a call to battle—we have to battle those little LEO guys. "We can't possibly let them share our spectrum—this is our sacred stuff." Joe's gotta have his warehouse because Ralph gave it to him, right? I don't look at this so much as a call to arms... I think it's a wake-up call.

I think that if we look at ourselves objectively, we have to say that we're grossly inefficient and that we're wasteful. We've been given a precious public resource and we're not utilizing it properly. Now if the Little LEO guy can put his spread spectrum satellite on top of two meters and claim that he's not going to interfere with us and he'll accept whatever we can dish at him because he knows how to handle it... Well, it's hard to argue that we're not going to share this underutilized resource with you because... because Ralph said it belonged to Joe... And I believe that this coexistence has been demonstrated to some extent with the STAs that were mentioned earlier in the Spread Spectrum talks today.

I would submit that a single 9600 baud data repeater, in a band crowded with voice repeaters used perhaps 1 hour out of 24, is a better, higher use of a repeater pair in advancing the goals of the Amateur Radio Service than yet another voice repeater.

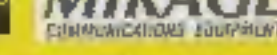
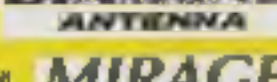
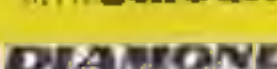
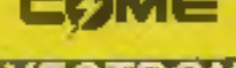
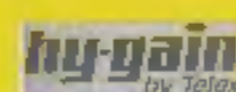
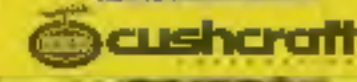
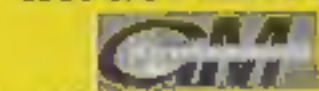
Within the last few weeks yet another "spectrum grab" of amateur radio spectrum has commenced. The biggest controversy raging in the commercial wireless field is the question of where in the RF spectrum allocations of the U.S. "3G" wireless telephone services should be placed. Most other parts of the world have agreed to a standardized set of spectrum that in the U.S. is



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allocated to military use, including satellite communications. In the U.S. there won't be any easy answers to the "3G" spectrum problem, and the pressure to find more spectrum for new services is building. I seriously doubt that amateur radio will be able to "defend its turf" in the next big battle regarding use of its spectrum.

The Death of Metricom

As I write this (very close to deadline), Metricom has died as a corporate entity, and the disposal of its assets at auction will commence shortly. Metricom was the parent company of the innovative Ricochet wireless internet access system. Ricochet used a network of nodes mounted on streetlights to relay to "Wired Access Points" (WAPs) where data packets transitioned from wireless to wired infrastructure. Ricochet offered 28 Kbps mobile internet access in San Francisco/San Jose, Seattle, and Washington, DC. In 2000 it began offering Ricochet II 128 Kbps mobile wireless internet access service in other areas such as San Diego, Los Angeles, and a number of other cities. Ricochet and Ricochet II were a technical success, but a business failure.

Of interest to hams, Ricochet (28 Kbps) used Frequency Hopping Spread Spectrum (FHSS) technology and operated as a digipeater network in the 902-928 MHz Industrial Scientific and Medical (ISM) band, which amateur radio shares. Ricochet II (128 Kbps) operated as a "full duplex repeater" with user access on 902-928 MHz, and backbone connections between pole-tops and WAPs on 2.4 GHz (also an ISM band) and licensed 2.3 GHz Wireless Communications Service (WCS) band (ironically, in this discussion, removed from the Amateur Radio Service a few years ago).

There is considerable speculation that even if a last-minute purchase of

Metricom's assets occurs, there will be considerable amounts of Ricochet equipment appearing on the open market. Some pole-top units have already appeared on eBay. There are a number of discussions underway about the possibility of resurrecting parts of the Ricochet networks (particularly in the San Francisco area where it's been operational for at least eight years). There are also some discussions underway about how Ricochet equipment could be modified for use in amateur radio.

In many, many ways the Ricochet network was every bit, and more, of what amateur radio networking aspired to be. It was low power, low profile, peer-to-peer, reasonable speed TCP/IP. Ricochet modems can be connected peer-to-peer, and software is available for Ricochet modems to connect in a "star" network configuration. If a number of features of the Ricochet network are familiar, that's because Ricochet was inspired by the first amateur radio Net/ROM digipeater/backbone networks in California.

It's purely speculative at this point, but surplus/modified Ricochet equipment may well be used to form the basis of new amateur radio networks. If enough of the Ricochet technology could be understood, perhaps spread spectrum radios could be developed for amateur radio use in the 420-450 MHz band. Note that the 902-928 MHz band offers approximately the same amount of spectrum as 420-450 MHz. Since FHSS technology works well in 30 MHz at 902-928 MHz, it can likely be made to work at 420-450 MHz. As to interference potential, it seems unlikely (to me) that a transmission of <100 mS on the input of a voice repeater channel will impact the repeater's operation very severely, especially when the repeater is idle more than 90% of the time.

During the TAPR Spread Spectrum Special Temporary Authority (STA) that preceded the most recent Part 97 rules change relating to Spread Spectrum operations, I received an interesting e-mail message from an amateur in California. He had built a Frequency Hopping Spread Spectrum system, and as a test of *real world compatibility* with voice repeaters, programmed his system's hopping pattern to use *only the input channels* of voice repeaters in the area. No one even noticed his Frequency Hopping Spread Spectrum system in operation! To me, that said a lot.

As always, comments and questions on these and other topics are welcome, and greatly appreciated.

73, Steve, N8GNJ

CQ Sneak Previews on "Spectrum"

Tune into a sneak preview of each upcoming issue of CQ, with Editor Rich Moseson, W2VU, the fourth weekend of each month on the "Spectrum" radio program, broadcast worldwide on shortwave over WWCR Radio, 5.070 MHz, Saturdays at 11:00 PM Eastern time.

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